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FUTURES MARKETS AND PRODUCER MARKETING OF HOGS - WITH EMPHASIS ON UNDERSTANDING THE SPREADS BETWEEN FUTURES

by

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Futures contracts for fed hogs are traded for delivery in February, April, June, July, August, October, and December. Trading on each contract normally begins at least one year prior to its expiration/delivery period. Therefore, a hog producer, by selling a futures contract, can sell hogs even before his sows are bred. In contrast, on a cash basis, the hogs can only be sold when they reach market weight. Thus, futures contracts extend a hog producer's potential sell period by one year.

Before incorporating futures into a marketing strategy, a producer must understand what a futures price is. First, a futures price is the price expected as of the present time for some future date. That is, a futures price is based on information presently available about the supply and demand factors which affect the futures price. In addition, as new or more accurate information becomes available, the futures price will change to reflect this new information. Second, a futures price is not the price expected at the local market. It is the price expected at Peoria, Illinois. To obtain the price expected at the local market, the futures price must be adjusted by the average local cash basis. The local cash basis is the difference between the futures price closest to but following a given day and the local cash price quoted on that day. The average local cash basis is the average of the bases observed on the given day over several years. (For a more complete discussion of the fed hog basis in

Ohio see The Fed Hog Basis in Ohio, 1972 - 1980, Carl Zulauf and Greg Sharp, ESO 862, Department of Agricultural Economics and Rural Sociology, The Ohio State University, September 1981.)

By comparing his cost of production with the futures price adjusted by his local basis, a hog producer can obtain an indication of expected returns (or losses) from feeding hogs. Based on this information, the producer may decide to alter his production plans and/or sell a futures contract (hedge), forward contract, or wait to sell on the cash market. Thus, regardless of whether a producer hedges or not, futures prices provide information which can help maximize profits.

Just as important as understanding the level of futures prices is understanding the differences or spreads between futures prices. For grains, the spreads between futures only reflect the amount of grain expected to be in storage. (Holbrook Working, "The Theory of Price of Storage," American Economic Review, December 1949, pp. 1254-1262.) However, pork differs from the grains in two important marketing characteristics. First, hogs are continuously harvested (slaughtered). Secondly, pork's perishability means that it can be stored for only a short period of time. Thus, unlike grains where present supply comes only from stocks except at harvest time, present pork supplies come from both perishable stocks and the current slaughter. Therefore, there is no comparable variable for pork to that of stocks for the grains.

Given the above, what determines the spreads between hog futures? One obvious candidate is an expected change in the supply of pork. If the spread between futures prices is defined as follows: (nearby futures - distant futures) divided by (nearby futures); an increase in the number of sows expected to be farrowed compared with past farrowings should cause this spread value to be positive. That is, expanded farrowings should led to more hogs in the future which should depress the distant futures which should cause the nearby futures to be higher than the distant futures. In contrast, a decrease in the number

of sows expected to be farrowed relative to past farrowing should cause the distant futures to have a higher price than the nearby futures (the spread is negative).

Given the expected change in supply, the size of the immediate pork supply should also affect the spread. As indicated above, the immediate supply of pork consists of pork in storage and the number of hogs ready for slaughter. This immediate supply must be used to meet the immediate demand for pork. Futhermore, because of pork's perishability, the immediate supply must be used in a reasonably short period of time. Therefore, a small immediate supply of pork must be rationed among consumers. The result is that the nearby futures price should increase relative to the distant futures price. In contrast, a large immediate supply of pork must be consumed in a reasonably short period of time. The result is that the nearby futures price must decline relative to the distant futures price. To summarize, the former situation should cause the spread to become more positive while the latter should cause the spread to become more negative.

Unlike the above discussed supply factors, most demand factors for pork tend to be stable over short periods of time. Population growth and population level, income level and growth, and the taste and preference for pork change slowly over time. In addition, beef production will change little over a one year period. However, poultry production, in particular broiler production, can change over a short period of time. In the case of broilers, a market ready bird can be produced in seven and one-half weeks from the date the bird is hatched. Thus, broiler producers can respond fairly rapidly to economic incentives or disincentives. An expected increase in broiler production should depress the distant futures price relative to the nearby futures price. That is, the spread should become more negative to reflect the expected increase in broiler supplies. On the other hand, an expected decrease in broiler production should cause the spread to become more positive.

A statistical analysis was made of the above discussed relationships. Futures price spreads were examined for the period 1972-1981. They were examined for the June-October and December-April spreads (four months); for the June-December and December-June spreads (six months); and for the June-April and December-October spreads (ten months). The June and December contracts were chosen as the nearby contracts because the USDA's national reports on hogs and pigs are dated June 1 and December 1. These reports contain the number of sows farrowed the previous six months, the number of sows intended to be farrowed during the next six months, and the number of hogs and pigs by various weight classifications.

The shift in supply was measured as a percentage change using the following formula: (farrowings the previous six months - farrowing intentions for the next six months) divided by (farrowings for the previous six months). The number of hogs ready for slaughter was measured as the number of market hogs over 180 pounds. The amount of pork in storage was taken from a USDA report on cold storage and is the amount of frozen pork held in warehouses. Lastly, the expected change in broiler production was measured by the broiler price to feed price ratio. This ratio measures the economic incentive to increase broiler production. The higher this ratio the greater the inducement to expand production; hence, the more negative the spread as the distant futures should decline relative to the nearby futures to reflect the expected increase in broiler supplies. On the other hand, the lower this ratio the greater the inducement to reduce production; hence, the more positive the spread.

Statistical analysis revealed that these four variables explained 74 percent of the variation in the four month spread, 83 percent of the variation in the six month spread, and 83 percent of the variation in the ten month spread. In addition, each variable affected the spread in the manner discussed above.

What do these finding mean for pork producers? The large amount of variation explained indicates that the spreads do reflect the market information economic theory and common sense indicates they should reflect. Therefore, this finding should enhance the confidence a producer has in the accuracy of live hog futures prices. However, it does not mean that the futures price will not change before the contract expires. Futures prices are expected prices. As such, they and the resulting spreads will change as more accurate or new information becomes available about past events and as expectations change.

Since the spreads reflect to a large degree the market information discussed above, a producer can examine the spreads for an indication of the price affect of that market information. In addition, since none of the spreads were perfectly explained, a producer in comparing his market information with that indicated by the spreads may decide that the market has not incorporated all the relevant information. Thus, he may try to "outguess" the market. However, since at least 74 percent of the variation in spreads is explained by the four market factors and only 26 percent is not, the probabilities are not in the producer's favor.

In conclusion, the size of the immediate pork supply and expected changes in the pork supply and broiler production explain a large part of the variation in live hog futures price spreads. Thus, a hog producer should track these market variable as he plans his marketing and production schedule. In turn, this knowledge should improve his profits.